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[2665] Effect of an Impedance Threshold Device and a Novel Active Compression Decompression Cardiopulmonary Resuscitation Device on Cerebral Perfusion Pressures and 24-Hour Neurological Survival in a Porcine Model of Cardiac Arrest

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Background: An impedance threshold device (ITD) has been shown to increase hemodynamics and neurologically intact survival after 6 min of untreated ventricular fibrillation (VF) in pigs. We tested the hypothesis that use of a novel manual adhesive-based active compression decompression cardiopulmonary resuscitation (ACD CPR) device designed to improve the ergonomics of manual ACD CPR + an ITD would increase neurologically intact survival, coronary and cerebral perfusion pressures and carotid artery blood flow after cardiac arrest.

Methods: Female farm pigs (27.8±0.6 Kg) anesthetized with propofol were studied in two protocols. In Protocol I, 8 pigs were subjected to 8.5 min of VF followed by standard (STD) CPR and ACD CPR + ITD in randomized order for 5 min each. Cerebral perfusion pressure, the primary end point, was measured as the delta between mean arterial pressure and intracranial pressure. Data were analyzed by paired *t*-test. In Protocol II, pigs were subjected to VF for 8.5 min and then randomized to STD CPR (n=9) or ACD CPR + ITD (n=8) for 6 min. Hemodynamics and 24-hr neurological survival were evaluated.

Results: Pigs treated with ACD CPR + ITD had significantly higher cerebral perfusion pressures compared with STD CPR [28.7 mmHg ± 4.3 vs. 8.1 mmHg ± 0.5, during the compression phase ($p<0.005$) and 2.0 mmHg ± 0.7 vs. -5.1 mmHg ± 1.1, during the decompression phase ($p<0.01$), respectively]. Pigs in Protocol II treated with ACD CPR + ITD had significantly improved coronary perfusion pressures (29.5 ± 2.7 vs. 22.4 ± 1.6 mmHg, $p<0.05$), carotid blood flow (44.0 ± 12.2 versus 30.9 ± 10.4 ml/min, $p<0.05$), and 24-hr neurological survival (88% vs. 22%, $p<0.02$).

Conclusions: After 8.5 min of untreated VF in a swine model of cardiac arrest use of a novel ACD CPR device + an ITD significantly increased key hemodynamic parameters and neurologically intact 24-hr survival rates compared with STD CPR.